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ATLSS Integrated Building System

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EMERGING CONSTRUCTION TECHNOLOGIES

Civil - Building Systems

ATLSS INTEGRATED BUILDING SYSTEM

THE NEED

The procedure for erecting building structures has changed very little during the past few years. Field work requires workers to perform complicated and strenuous tasks in a highly dangerous environment. There is a need to develop new technology to protect workers from the dangerous job environment and emphasize cost-efficiency, especially in the construction of multistory structures with repeated cycles.

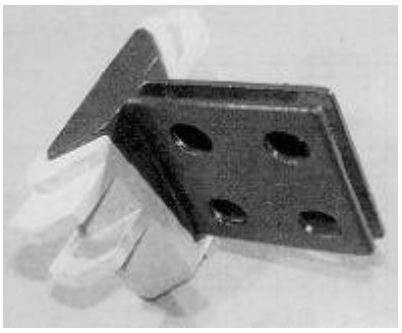

FIGURE 1 ATLSS CONNECTOR

THE TECHNOLOGY

The AIBS (ATLSS Integrated Building Systems) program was developed to coordinate ongoing research projects in automated construction and connection systems. The objective of this technology is to design, fabricate, erect, and evaluate cost-effective building systems with a focus on providing a computer integrated approach to these activities.

FIGURE 2 MORTISE ON COLUMN FLANGE AND TENON ON BEAM

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A family of structural systems, called ATLSS beam-to-column connections, in both concrete and steel, will possess the capability of being erected by automated construction techniques. The technology for automated construction is heavily dependent on the use of Stewart platform cranes which are controlled by a system of six cables to allow precise movement in six directions.

FIGURE 3 BAY BEING ASSEMBLED ON GROUND

THE BENEFITS

- The emphasis of these new designs is on cost-efficient fabrication as well as geometric configurations which provide an automatic self-guided erection feature to greatly facilitate initial placement. This feature will minimize human assistance during construction and will result in quicker, less expensive erection procedures in which workers are less susceptible to injury or fatalities.
- A model building frame was developed as a case study to compare the AIBS system to conventional construction. Based on the results, the range of projected cost savings with the introduction of the ATLSS connector was between 9% and 12%. The range of projected cost saving with both the ATLSS connector and Stewart platform crane being used was estimated to be between 12% and 18%.

STATUS

ATLSS researchers demonstrated the connections and a prototype model of the Stewart platform in February 1992. A consortium of government, industry, and university partners is envisioned as the most effective mechanism to move these technologies from the laboratory to the field.

BARRIERS

The ATLSS connections have been used successfully but the use has been limited. Future use and technology transfer to the industry will be required.

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Points of Contact

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Reviewers

Peer reviewed as an emerging construction technology

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